Thank you for buying ALIGN products. The T-REX 450PRO 3GX is the latest technology in Rotary RC models. Please read this manual carefully before assembling and flying the new T-REX 450PRO 3GX helicopter. We recommend that you keep this manual for future reference regarding tuning and maintenance.

In addition, we highly recommend you to familiarize yourself with the basic knowledge and principles of RC helicopters. This manual is not intended to provide comprehensive guidance, but rather to assist you in understanding the key features and functions of the T-REX 450PRO 3GX. We encourage you to consult with experienced operators or instructors to enhance your flying experience.
Thank you for buying ALIGN Products. The T-REX 450PRO 3GX Helicopter is designed as an easy to use, full featured Helicopter/R/C model capable of all forms of rotary flight. Please read the manual carefully before assembling the model, and follow all precautions and recommendations located within the manual. Be sure to retain the manual for future reference, routine maintenance, and tuning. The T-REX 450PRO 3GX is a new product developed by ALIGN. It features the best design available on the Micro-Heli market to date, providing flying stability for beginners, full aerobatic capability for advanced flyers, and unsurpassed reliability for customer support.

Thank you for buying ALIGN Products. The T-REX 450PRO 3GX Helicopter is designed as an easy to use, full featured Helicopter/R/C model capable of all forms of rotary flight. Please read the manual carefully before assembling the model, and follow all precautions and recommendations located within the manual. Be sure to retain the manual for future reference, routine maintenance, and tuning. The T-REX 450PRO 3GX is a new product developed by ALIGN. It features the best design available on the Micro-Heli market to date, providing flying stability for beginners, full aerobatic capability for advanced flyers, and unsurpassed reliability for customer support.

WARNING LABEL LEGEND 標誌代表意義

---

**WARNING**
Mishandling due to failure to follow these instructions may result in damage or injury.
因為疏忽這些操作說明，而使用錯誤可能造成財產損失或嚴重傷害。

---

**CAUTION**
Mishandling due to failure to follow these instructions may result in danger.
因為疏忽這些操作說明，而使用錯誤可能造成危險。

---

**FORBIDDEN**
Do not attempt under any circumstances.
在任何禁止的環境下，請勿嘗試操作。

---

IMPORTANT NOTES 重要聲明

R/C helicopters, including the T-REX 450PRO 3GX are not toys. R/C helicopter utilize various high-tech products and Technologies to provide superior performance. Improper use of this product can result in serious injury or even death. Please read this manual carefully before using and make sure you are conscious of your own personal safety and the safety of others and your environment when operating all ALIGN products.

Manufacturer and seller assume no liability for the operation or the use of this product. Intended for use only by adults with experience flying remote control helicopters at a legal flying field. After the sale of this product we cannot maintain any control over its operation or usage.

T-REX 450PRO 3GX遙控直升機並非玩具，他是結合了許多高科技電子所設計出來的休閒用品，所以商品的使用當中或不熟悉都可能造成嚴重傷害甚至死亡。使用之前請務必詳讀本說明書，並親自注視設備性能，注意！任何遙控直升機的使用，製造商和經銷商是無法對使用者於機器使用中損壞或組裝不當所發生之意外負任何責任，本產品是提供給操作遙控模型直升機經驗的成人及有相關技術的人員在合法指導下合法飛行場飛行，以確保安全無虞下操作使用，產品售出後本公司將不負任何操作和使用控制上的任何責任及安全責任。

We recommend that you obtain the assistance of an experienced pilot before attempting to fly our products for the first time. A local expert is the best way to properly assemble, setup, and fly your model for the first time. The T-REX 450PRO 3GX requires a certain degree of skill to operate, and is a consumer item. Any damage or dissatisfaction as a result of accidents or modifications are not covered by any warranty and cannot be returned for repair or replacement. Please contact our distributors for free technical consultation and parts at discounted rates when you experience problems during operation or maintenance.

模型商品屬於高風險操作項目為消耗性之商品，如經拆裝使用後，會造成不等情勢零件損耗，任何使用情隨商品不良或不良，將無法於保固條件內更換新品或退貨，如遇有使用操作維修問題，本公司全省分公司或代理商將提供技術指導，特價零件供應服務。

---

2. SAFETY NOTES 安全注意事項

---

**CAUTION**
Fly only in safe areas, away from other people. Do not operate R/C aircraft within the vicinity of homes or crowds of people. R/C aircraft are prone to accidents, failures, and crashes due to a variety of reasons including, lack of maintenance, pilot error, and radio interference. Pilots are responsible for their actions and damage or injury occurring during the operation or as a result of R/C aircraft models.

遙控模型飛機、直升機屬高風險性商品，飛行時務必遠離人群，飛行時務必遠離機件損壞，電子控制設備不良，以及操作上的不熟悉，都有可能導致飛行失控損壞等不可預期的意外，請飛行者務必注意飛行安全，並需了解負擔您所造成任何意外之責任。
LOCATE AN APPROPRIATE LOCATION

R/C helicopters fly at high speed, thus posing a certain degree of potential danger. Choose an appropriate flying field consisting of flat, smooth ground without obstacles. Do not fly near buildings, high voltage cables, or trees to ensure the safety of yourself, others, and your model. For the first practice, please choose a legal flying field and can use a training kit to fly for reducing the damage. Do not fly your model in inclement weather, such as rain, wind, snow, or darkness.

PREVENT MOISTURE

R/C models are composed of many precision electrical components. It is critical to keep the model and associated equipment away from moisture and other contaminants. The introduction or exposure to water or moisture in any form can cause the model to malfunction resulting in loss of use, or a crash. Do not operate or expose to rain or moisture.

PROPER OPERATION

Please use the replacement of parts on the manual to ensure the safety of instructors. This product is for R/C model, so do not use for other purpose.

WARNING

OBTAIN THE ASSISTANCE OF AN EXPERIENCED PILOT

Before turning on your model and transmitter, check to make sure no one else is operating on the same frequency. Frequency interference can cause your model, or other models to crash. The guidance provided by an experienced pilot will be invaluable for the assembly, tuning, trimming, and actual first flight. (Recommend you to practice with computer-based flight simulator.)

WARNING

SAFE OPERATION

Operate this unit within your ability. Do not fly under tired condition and improper operation may cause in danger.

CAUTION

ALWAYS BE AWARE OF THE ROTATING BLADES

During the operation of the helicopter, the main rotor and tail rotor will be spinning at a high rate of speed. The blades are capable of inflicting serious bodily injury and damage to the environment. Be conscious of your actions, and careful to keep your face, eyes, hands, and loose clothing away from the blades. Always fly the model a safe distance from yourself and others, as well as surrounding objects. Never take your eyes off the model or leave it unattended while it is turned on. Immediately turn off the model and transmitter when you have landed the model.

CAUTION

KEEP AWAY FROM HEAT

R/C models are made of various forms of plastic. Plastic is very susceptible to damage or deformation due to extreme heat and cold climate. Make sure not to store the model near any source of heat such as an oven, or heater. It is best to store the model indoors, in a climate-controlled, room temperature environment.

Remote-controlled models are often made of PA, POM, polyethylene, and other materials which may be affected by high temperature or prolonged heat exposure. It is recommended to store them away from heat sources to prevent damage.
### 3. Equipment Required for Assembly

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter</td>
<td>6-channel or more, helicopter system</td>
<td>1 pc</td>
</tr>
<tr>
<td>Receiver</td>
<td>7-channel or more, or remote receiver</td>
<td>1 pc</td>
</tr>
<tr>
<td>Battery</td>
<td>11.1V 3S 2100-2500mAh Li-Po x 1 pc</td>
<td></td>
</tr>
<tr>
<td>Dial Pitch Gauge</td>
<td>x 1 pc</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Tools Required for Assembly

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scissors</td>
<td></td>
</tr>
<tr>
<td>Cutter Knife</td>
<td></td>
</tr>
<tr>
<td>Diagonal Cutting Pliers</td>
<td></td>
</tr>
<tr>
<td>Needle Nose Pliers</td>
<td></td>
</tr>
<tr>
<td>Hexagon Screw Driver</td>
<td></td>
</tr>
<tr>
<td>Philips Screw Driver</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Package Illustration

- 325 3G Carbon fiber blade x 1 set
- 325 3G碳纖主旋翼 x 1組
- 3GX Flybarless System
- 3GX無尾平衡系統

- 450HT8 Frame set
- 450HH
- 450HH10
- 450HB9
- 450HB11
- 45HT
- 450HG1
- 450HZ
- 450MX Brushless motor x 1
- 450MX無刷馬達 x 1
- RCE-BL35X Brushless ESC x 1
- RCE-BL35X無刷電調器 x 1
- DS520 Digital Servo x 1
- DS520數位伺服器 x 1
- DS410M Digital Servo x 3
- DS410M數位伺服器 x 3
5. SAFETY CHECK BEFORE FLYING 飛行前安全檢查重要事項

**CAREFULLY INSPECT BEFORE REAL FLIGHT 請嚴格執行飛行前檢查義務**

* Before flying, please check to make sure no one else is operating on the same frequency for the safety.
* Before flight, please check if the batteries of transmitter and receiver are enough for the flight.
* Before turn on the transmitter, please check if the throttle stick is in the lowest position. IDLE switch is OFF.
* When turn off the unit, please follow the power on/off procedure. Power ON - Please turn on the transmitter first, and then turn on receiver. Power OFF - Please turn off the receiver first and then turn off the transmitter. Improper procedure may cause out of control, so please to have this correct habit.
* Before operation, check every movement is smooth and directions are correct. Carefully inspect servos for interference and broken gear.
* Check for missing or loose screws and nuts. See if there is any cracked and incomplete assembly of parts. Carefully check main rotor blades and rotor holders. Broken and premature failures of parts possibly cause resulting in a dangerous situation.
* Check all ball links to avoid excess play and replace as needed. Failure to do so will result in poor flight stability.
* Check the battery and power plug are fastened. Vibration and violent flight may cause the plug loose and result out of control.

★ 每次飛行前應先確認所使用的頻率是否會干擾他人，以確保你自身與他人的安全。
★ 每次飛行前確定電器機及接收機電池的電量是在足夠飛行的狀態。
★ 啟動前確認油門搖桿是否在最低點，熄火後再啟動，定速再啟動（Idle）是否在適當位置。
★ 啟動時必須遵守電器機操作程序，啟動時應先啟動電器機，再啟動接收機電源。開關時應先關閉接收機，再關閉電器機電源。不正確的開關程序可能會產生失控的情況，影響自身及他人的安全，請養成正確的習慣。
★ 啟動前請確認慣性機的動作是否順暢，及方向是否正確，並檢查保護器的動作是否有干涉或崩解的情形，使用故障的保護器將導致不可預期的危險。
★ 飛行前確認沒有缺少或鬆脫的螺絲與電線，確認沒有組裝不完整或損壞的零件，仔細檢查主旋翼是否損壞，特別是接近主旋翼尖端的部位。損壞或組裝不完整的零件不僅影響飛行，更會造成不可預期的危險。注意切割損耗、有裂痕零件更新及定期保養檢查的重要性。
★ 檢查所有的連桿件是否有損壞的情形，過載的連桿應先更新，否則將造成異常無法操作的危險。
★ 確認電池及電源接頭是否固定牢靠，飛行中的震動或激烈的飛行，可能造成電源接頭鬆脫而造成失控的危險。

<table>
<thead>
<tr>
<th>Standard Equipment 標準配備</th>
</tr>
</thead>
<tbody>
<tr>
<td>450HC</td>
</tr>
<tr>
<td>450HH</td>
</tr>
<tr>
<td>450HH10</td>
</tr>
<tr>
<td>450HB9</td>
</tr>
<tr>
<td>450HB11</td>
</tr>
<tr>
<td>45HT</td>
</tr>
<tr>
<td>450HT8</td>
</tr>
<tr>
<td>450HG1</td>
</tr>
<tr>
<td>450HZ</td>
</tr>
<tr>
<td>450MX Brushless motor x 1</td>
</tr>
<tr>
<td>450MX無刷電機 x 1</td>
</tr>
<tr>
<td>RCE-BL35X Brushless ESC x1</td>
</tr>
<tr>
<td>RCE-BL35X遙控電源 x 1</td>
</tr>
<tr>
<td>DS520 Digital Servo x 1</td>
</tr>
<tr>
<td>DS520數位遙控器 x 1</td>
</tr>
<tr>
<td>DS410M Digital Servo x 3</td>
</tr>
<tr>
<td>DS410M數位遙控器 x 3</td>
</tr>
<tr>
<td>3GX Flybarless System</td>
</tr>
<tr>
<td>3GX飛線系統</td>
</tr>
<tr>
<td>325 3G Carbon fiber blade x 1</td>
</tr>
<tr>
<td>325 3G碳纖維螺旋槳 x 1</td>
</tr>
</tbody>
</table>

When you see the marks as below, please use glue or grease to ensure flying safety.

標有以下符號之組裝步驟，請配合上膠或上油，以確保使用之耐久度。

**CA:** Apply CA Glue to fix.
**R48:** Apply Anaerobics Retainer to fix.
**T43:** Apply Thread Lock to fix.

**Oil:** Add Grease.

**CA:** 使用瞬間膠固定
**R48:** 使用金屬環狀固定或固體潤滑
**T43:** 使用螺絲鎖
**Oil:** 添加潤滑油

When assembling ball links, make sure the "A" character faces outside.

各球疊軸鎖連桿頭底部，A字朝外。
6. ASSEMBLY SECTION

**450HH7**

- **Linkage ball A M2.5x3.3**
  - φ4.75x20.4mm

- **Washer**
  - φ5.5xφ8.0x0.4mm
  - x2

- **Thrust bearing**
  - φ3.0xφ8.0x3.5mm
  - x2

- **Bearing**
  - φ4xφ9.0mm
  - x4

**CAUTION**

Thrust bearing and washer for radial bearing are wear items, and thus should be inspected for replacement after every 20 flights. For flights with high headspeed, the inspection interval should be reduced to ensure flight safety.

For original manufactures, if the product is already assembled by Factory, please check again if screws are firmly secured and applied with some glue.

**Metal main rotor holder**

- **Apply grease on thrust bearing**
- **Linkage ball A M2.5x3.3**
  - φ4.75x20.4mm

- **‘IN’ mark faces inside**
  - Thin (larger ID)
  - Thick (smaller ID)

**Feathering shaft**

- φ2xφ4.0x1mm

**Apply grease**

**Metal main rotor housing**

- **Damper rubber**
  - φ4xφ6.5x1mm
  - x2

**Washer**

- φ2xφ6.0x0.6mm
  - x2

**Collar**

- φ4xφ6.5x1mm
  - x2

**Socket screw**

- φ4xφ6.0mm
  - x2

---

ALIGN
450HH7

- **Socket button head screw**
  - M2 x 12mm (4 pcs) x 3

- **Socket screw**
  - M2 x 12mm (2 pcs)

- **Bearing**
  - φ2.5 x 5.3 x 3.8 mm (4 pcs)

- **Bearing**
  - φ1.8 x 4.2 mm (4 pcs)

- **Washer**
  - φ2.3 x 3 x 9.8 mm (4 pcs)

- **Linkage ball A(M2x2.5)**
  - φ4.3 x 8.5 mm (3 pcs)

- **Long linkage ball(M2x2.5)**
  - φ4.3 x 19.4 mm (1 pc)

450HB11

- **Socket collar screw**
  - φ4.3 x 10 mm (2 pcs)

- **M2 Nut**
  - φ4.3 x 10 mm (2 pcs)

**Main shaft**
- φ5.3 x 75.1 mm (2 pcs)

**Linkage rod (F)**
- φ4.5 x 64.5 mm (3 pcs)

**Radius arm**
- φ15 x 4.2 mm (3 pcs)

**Radius arm**
- φ7.5 x 10 mm (3 pcs)

**Bearing**
- φ2.5 x 5.3 x 3.8 mm (4 pcs)

**Metal head stopper**
- φ4.3 x 8.5 mm (3 pcs)

**Socket collar screw**
- φ4.3 x 10 mm (2 pcs)

**Socket screw**
- M2 x 12mm (4 pcs)
If 3GX was to be mounted inverted (Position #1), connect the 3GX computer link, enter rudder parameters, set the left directional setting for anti-torque compensation to reverse.

While you stick 3GX on the bottom plate, please make sure the control panel is aimed at suitable position.

450HB10

- Bearing
  - M2.5 x 11 x 4 mm x 2

450HB10A

- Socket button head screw
  - M2.5 x 12 mm x 14
- M2.5 Set screw
  - M2.5 x 12 mm x 2
- Canopy mounting bolt
  - M4 x 24 mm x 2
**Main frame assembly point:**
First do not fully tighten the screws of main frames. Put the main shaft through the two bearings and check if the movements (up/down) are smooth. The bottom bracket must be firmly touched the level table top (glass surface); please keep the smooth movements on main shaft and level bottom bracket, then slowly tighten the screws. A correct assembly can help for the power and flight performance.

---

**DS410M Digital Servo:**
1. Stall torque (滿負載zn): 1.8kg.cm (4.8V)
2. Motion speed (動作速度): 0.13sec/60 (4.8V)
3. Dimension (尺寸): 22.8 x 12 x 25.4mm
4. Weight (重量): 13.3g

---

**Recommend sending the marked position with a waterproof abrasive paper (#800-1000) as below illustration to avoid the wires of electric parts to be cut.**

---

**Main shaft assembly:**
Press two main frames equally.
While assembling the slide shaft, please make sure to use the correct amount of T43 thread lock on the thread. Do not use R48 anaerobic retainer or other high-strength glue to avoid damaging or weakening the thread during maintenance or repairs. If using excessive T43 thread lock, it may cause damage to the retaining ring and bolt, which may result in the thread becoming loose. To avoid this, it is recommended to follow the instructions and use the correct amount of thread lock.

For the original factory package, if the product is already assembled by the factory, please note to check again. The assembly must be checked and applied with some glue. If the screws are not firmly secured, they may come loose during operation. Please make sure all parts are securely tightened.

When tightening a linkage ball to a plastic part, please use a small amount of CA glue and tighten it firmly, but not over-tightened, or they will break. If you are unsure about the amount of CA glue to use, it is recommended to consult the manufacturer or consult the manual for guidance. If tightened correctly, the linkage ball will not break.
When assembling into the tail boom, please apply some oil on the surface, to make it smooth during the assembling and keep it vertical with the torque tube for smooth rotation.

Before assembling, please wrap the tail boom with a scotch tape (Thickness 0.03-0.05mm) to avoid the mount slipping.

Tip to fix the torque tube: To fix MR64ZZ bearing on the torque tube, avoid CA glue adhering to the dust cover or it may cause the bearing stuck. When assembling into the tail boom, please apply some oil on the bearing holder and press the holder into the tail boom horizontally.

Spray Silicone oil inside the tail boom.

450HT1

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collar screw</td>
<td>M2 x 8mm x 2</td>
</tr>
<tr>
<td>Socket screw</td>
<td>M2 x 12mm x 2</td>
</tr>
<tr>
<td>Socket screw</td>
<td>M2 x 18mm x 2</td>
</tr>
<tr>
<td>Socket button head screw</td>
<td>M2 x 6mm x 2</td>
</tr>
</tbody>
</table>
Set the motor pinion gear to main drive gear mesh to approximately 0.1 mm to avoid excessive power consumption or motor burnout due to overload.

確認齒針匯流排與主轉動齒輪之間的間隔為約 0.1 毫米，以避免因過度負荷導致電機燒損。

Make sure the motor pinion gear parallel (match) evenly with the main gear while assembly.

組裝時，請確認齒針匯流排與主轉動齒輪平行。
1. Consult the following diagram for 3GX installation direction, with arrow pointing toward nose of helicopter. 3GX needs to be mounted flat on gyro mounting platform, away from vibration sources.

2. Two pieces of foam mounting tape can be used if helicopter experiences vibration induced flight instability. However, if this still doesn't cure the problem, please check the helicopter mechanics and minimize mechanical vibrations, or reduce the headspeed.

3. Please secure with genuine factory issued double sided anti-vibration mounting tape.

*If 3GX was to be mounted inverted (Position #1), connect the 3GX computer link, enter rudder parameters, set the left directional setting for anti-torque compensation to reverse.*

1. 3GX 3G direction pull the correct direction, with rudder parameters in the fixed position, and then move the servo to the correct position.

2. 薄膜加熱器會影響伺服器運作，造成飛行不穩定，可於3G下方貼3片泡沫減震，若仍未改善，請檢查伺服器相關連桿及線束是否有異常

3. 將使用原廠提供的泡沫減震墊材固定

【注意】選用3GX調整時的安裝方式時（位置1），請複唱至3GX電機介面，進入尾翼參數，將「反扭力補償」至倒的開關設定為方向，以免影響陀螺儀穩定效果。

---

**DS520 Digital Servo:**

1. 1520s standard band / 1520s特低頻系統
2. Stall torque: 19kg.cm (4.8V)
3. 25kg.cm (6.0V)
4. Motion speed: 0.09s/60° (4.8V)
5. 0.07s/60° (6.0V)
6. 4 Dimensions: 36 x 15 x 29.2mm
7. Weight: 25.9g

**450HB10A**

- Washer
- M2 Nut
- Socket button head self tapping screw
  - 半徑角60度六角頭自攻螺絲
- Linkage ball (M2x3.5)
  - 後端(16mm)

**450HZ12**

- Socket button head self tapping screw
- 半徑角60度六角頭自攻螺絲
8. BATTERY INSTALLATION ILLUSTRATION

Use attached Hoop and Loop Tape, tape the Hoop side (hooked) on the battery mounting plate and the Loop side (fuzzy) on the battery to fix the battery in order to prevent any slip.

NOTE: When installing the speed controller, please keep a distance at least 3cm from the receiver to avoid any interference.

9. CANOPY ASSEMBLY

Using the included foam tape on battery mount will effectively reduce vibration of canopy.

Canopy and Canopy nut are fixed with the included foam tape.
11. SERVO SETTING AND ADJUSTMENT

To set this option is to turn on the transmitter and connect to the helicopter power. Note: For the safety, please do not connect ESC to the brushless motor before the setting in order to prevent any accident caused by the motor running during the setting.

---

12. ADJUSTMENTS FOR GYRO AND TAIL NEUTRAL SETTING

Turn off Revolution mixing (RVMX) mode on the transmitter, then set the gain switch on the transmitter and the gyro to Head lock mode. The gain setting is about 70%, and after transmitter setting, connect to BEC power to work on tail neutral setting.

---

TAIL NEUTRAL SETTING

After setting Head Lock mode, correct setting position of tail servo and tail pitch assembly is as photo. If the tail pitch assembly is not at the neutral position, please adjust the length of rudder control rod to trim.

---

HEAD LOCK DIRECTION SETTING OF GYRO

To check the head lock direction of gyro is to move the tail counterclockwise and the tail servo horn will be trimmed clockwise. If it trims in the reverse direction, please switch the gyro to "REVERSE".

---

Align logos and text
13. PITCH AND THROTTLE SETTING

**GENERAL FLIGHT**

- **Stick position at high/Throttle 100% Pitch +9° → +11°**
  - Pitch range: Approx. 25 degrees.
  - If the pitch is set too high, it will result in shorter flight duration and poor motor performance.
  - Setting the throttle to provide a higher speed is preferable to increasing the pitch too high.

**IDLE 1: SPORT FLIGHT**

- **Stick position at medium/Throttle 90% Pitch 0°**

**3D FLIGHT**

- **Stick position at high/Throttle 100% Pitch +11°**
- **Stick position at low/Throttle 0% Pitch 0° → -2°**

---

**Throttle vs Pitch Curve**

- **Throttle Set Point**
  - 100% High
  - 90% Middle
  - 80% Low

---

**Throttle vs Pitch Curve**

- **Pitch Range**
  - 0° → 11°
FEATURES

3-axis gyroscopic flybarless system to simulate the stability of mechanical flybar system, yet at the same time achieving agile 3D performance.

Utilizes MEMS gyro sensors, which feature small footprint, high reliability, and excellent stability.

12 bit processors providing ultra high resolution, resulting in highly precise controls.

Supports Spektrum and JR satellite receivers.

Supports Futaba S.Bus architecture.

Software upgradable through PC interface adapter.

Simplistic setup process without the need of external devices. Setup is done through 5 steps and 2 sensitivity adjustments. Rudder setup is identical to GP780 gyro, minimizing learning curve.

Flybarless system dramatically improves 3D power output and efficiency, resulting in reduced fuel or electricity consumption.

Highly sensitive gyroscopic sensors combined with advanced control detection routine providing higher hovering and aerodynamic stability than other flybarless systems.

Suitable for all CCPM and mechanical mixing systems.

Built in speed governor function.

Compatible with helicopter of all sizes from T-Rex 250 to T-Rex 700.

Innovative pitch gauge as an aid to facilitate pitch adjustments.

High frame rate signal output for faster and higher precision servo response.

Capable to operate between 3.5V to 8.4V, compatible with high voltage servos.

Small footprint, light weight, minimalist and reliable design.

RoHS certified.

3GX FLYBARLESS SETUP INDICATORS

Flybarless system setup mode 無平衡翼系統設定模式:

Rudder gyro setup mode 尾舵陀螺儀設定模式:
1. Connect the receiver and servos to the flybarless control unit as per diagram found on page 21-22.
2. Digital servos must be used on cyclic to avoid damage to servos.
3. The trim must be zero when using 3GX, and should not be adjusted at anytime. If the helicopter hovering tend one side, it means the swashplate doesn't keep horizontal when setting. Go to flybarless system "Direct mode bypassing gyro, for mechanical travel and neutral point setup" to adjust the level of the swashplate and then re-complete the setup.
4. When the 3GX flybarless system is installed for the first time, a few simple setup steps and fly tests need to be performed in the flybarless setup mode. These steps need to be performed only during initial setup, and does not need to be repeated for subsequent flights. Just power up the system normally, check the proper servo operations, and fly. The initial setup procedure only need to be repeated after software upgrade, pitch range reset, or subtrims are added in the transmitter.

3GX Connectivity Method 3GX接線方式

Method 1: Standard receiver connectivity method 方式一：傳統接收器接線法

1. Connect all wires as shown in diagram. Receiver and 3GX wires are color coded to distinguish the different connection channels. Care should be taken to ensure proper wire color to channel connection.

2. Receiver power is achieved by connecting the 3GX "S.BUS/BIND" port to the ch7 or BATT port on receiver using supplied signal wire.

3. To avoid damage to servos, only digital servos should be used for swashplate. Recommended spec: 0.09s/60 or faster, with 2.2 Kg or higher torque.

4. 3GX has built in speed governor function which can be utilized by purchasing the optional speed sensor.

Method 2: Futaba S.BUS Connectivity method 方式二：Futaba S.BUS接線法

1. For Futaba S.BUS receivers, connect wires as shown in diagram.

2. Receiver power is supplied through S.BUS signal wire connected to 3GX' S.BUS/BIND port.

3. The default channel/function mapping when using S.BUS are:
   - (1) AIL (2) ELE (3) THR (4) RUD (5) GAIN (6) PIT (7) GOV
4. The default channel mapping when using S.BUS are:
   - (1) AIL (2) ELE (3) THR (4) RUD (5) GAIN (6) PIT (7) GOV

5. If channel 3 is set as PIT and channel 6 set as THR on transmitter, such as BFG, 12x, 14MZ, etc, please reprogram the transmitter to utilize channel 3 as THR and channel 6 as PIT.

6. To avoid damage to servos, only digital servos should be used for swashplate. Recommended spec: 0.09s/60 or faster, with 2.2Kg or higher torque.

7. 3GX has built in speed governor function which can be utilized by purchasing the optional speed sensor.

8. Governor setting is done through channel 7 on the receiver.

9. Please refer to the diagram for wiring. Receiver and 3GX use different color to distinguish the different connections. Care should be taken to ensure proper wire color to channel connection.

10. Receiver power is achieved by connecting the 3GX' S.BUS/BIND port to the ch7 or BATT port on receiver using supplied signal wire.

11. If the swashplate is not level, it must be set to zero. The swashplate can be adjusted by moving the swashplate adjustment knob.

12. The swashplate can be adjusted by moving the swashplate adjustment knob.

13. The swashplate can be adjusted by moving the swashplate adjustment knob.

14. The swashplate can be adjusted by moving the swashplate adjustment knob.
Method 3: JR/SPEKTRUM Satellite connectivity method

1. For JR or Spektrum satellite receivers, connect wires as shown in diagram.
2. To avoid damage to servos, only digital servos should be used for swashplate. Recommended spec: 0.09s/60° or faster, with 2.2Kg or higher torque.
3. 3GX has built in speed governor function which can be utilized by purchasing the optional speed sensor. Governor setting is done through channel 7 on the receiver. Channel 6/GEAR controls RPM of speed governor, channel 7/AUX2 controls rudder gyro gain. For radios with less than 6 channels, please use the standard receiver connectivity method.
4. For radios with less than 6 channels, channel 6/GEAR is used for rudder gyro gain. Speed governor cannot be used. For safety concern, two satellite receivers should be used, with each antenna perpendicular (90 degrees) from each other. A satellite receiver should be installed on each side of the frame, separate by minimum distance of 5cm.
5. Should both satellite receivers loose connectivity during flight, LED1 ~ LED6 will flash continuously as warning. A single power cycle of the system will not clear this error. The system need to be power cycled the second time to reset.
6. default channel/function mapping when using satellite receiver are:

   (1) THR   (2) AIL   (3) ELE
   (4) RUD   (5) GYR   (6) PIT   (7) GAIN

Failsafe (Last Position Hold) 失速保護(保留最後指令)

When helicopter lost connectivity with your radio under this setting, all channels will hold at the last command position, except throttle channel which goes to a preset position.
1. Push throttle stick to the desired fail safe position.
2. Plug the binding plug into 3GX’s BIND port, and perform radio binding steps.
3. After successful binding, do not power off the 3GX, unplug the binding plug and allow 3GX to enter initializing process. The last position hold function will be active after the 3GX initializes.
4. Test Method: Power off transmitter. The throttle channel should move to preset position, while all other channels should hold in their last position.

Failsafe (Pre-set Position Hold) 失速保護(預設預置)

When helicopter lost connectivity with your radio under this setting, all channels will move to the pre-set position.
1. Plug the binding plug into 3GX’s BIND port, and power up the 3GX. After the rapid flash of satellite’s LEDs, pull the binding plug off.
2. Power up radio transmitter, and perform radio binding steps. After radio is bound, LED on the satellite antennas will end the rapid flash, following by slower flash.
3. Move the transmitter sticks to the desired failsafe position while the LED is flashing in slower mode.
4. Satellite antenna’s LED will lit up after 5 seconds, and 3GX goes through initializing process. The failsafe position will be set after the 3GX initializes.
5. Test Method: Power off transmitter, and all channels should move to the pre-set failsafe position.
1. DIR: Direct mode to bypass gyro for mechanical travel and neutral point setup
   DIR機構行程與中立點設定模式

Setup method for 3GX flybarless system is same as the 3G flybarless system.
3GX無平衡翼系統設定方式與3G相同

Step 1.1: Enter the DIR settings
Press and hold the SET button while powering up the receiver. Release the button when LED 1-5 begin to cycle. (Note) The DIR green LED will light up indicating the gyro has been bypassed for neutral and mechanical travel range setup.

Note: If pressed for more than 2 seconds, 3GX will enter governor setup mode.

Transmitter function to servo mapping
遙控器對應伺服器關係

Aileron 副翼 Pitch 橫幅
Elevator 升降板

Step 1.2: Swashplate function check
Verify the correct swashplate movements for PIT, AIL, and ELE inputs.
確認十字盤動作PIT, AIL, ELE是否正確。

Step 1.3: Mechanical Setup
Adjust the servo neutral point and main blade pitch.
調整個體中立點及主翼角度(見圖示)。

Horizontally Level 水平

Adjust subtrims on transmitter so serve horn is horizontally level 將調校器中立點水平(subtrim)
Step1.4: Collective pitch setup

- 調整最大共軸偏角使用傳輸器的旋翼混合功能（pitch swash AFR）。推薦最大共軸偏角為6.0以內，最大偏角為30.0度。建議共軸偏角為5.0度。超級使用者不超過5.0度為佳。

注意：
- 不調整個別機翼的伺服器位置。選擇個別機翼的軸組位移後的混合設定。應使用飛行器個別設定，因為個別設定的混合設定。
- 使用3G FBL系統時，務必關閉以下功能：
  - Swash Ring
  - Linkage Compensation
  - Swash Mix
  - Mixing
  - Acceleration

- 使用的偏角角度校正器和偏角測試器

Step1.5: Cyclic pitch setup

- 最大偏角設定：輪緣平行於飛行器，調整螺旋桿，調整機翼的偏角。

注意：
- 調整後飛行器的混合設定應與傳輸器的混合設定相同。若傳輸器的混合設定不同，請參考傳輸器的手冊。

2. E.LIM swashplate mixing type recognition and elevator endpoint setup

E.LIM十字斷落辨識及升降機行程量設定模式：

Step2.1: Entering E.LIM setup mode

- 保持旋翼速度及主偏角為零度，按住SET鍵3秒後點火。保持E.LIM LED亮起，進入E.LIM升機行程量設定模式。

注意：
- 航向主偏角設定在0度的位置，不會再移動。
Step 2.2: Swashplate mixing type recognition and elevator endpoint setup

步課 2.2：十字盤混控校準與升降舵行程量設定

With all channels stationary, move the transmitter elevator stick forward, and then back to center position. This completes the swashplate mixing type recognition process. The control unit will determine the CCPM mixing ratio or traditional mechanical mixing maximum elevator endpoints.

将遥控器升降舵杆至前方(請勿動到其他舵面動作)，再將升降舵桿復回中間位置，完成此報式設定。

Calculation CCPM混控比例或傳統十字盤模式及前後可用行程。

**CAUTION 注意**

Throttle stick position where main pitch is 0 degree must be maintained through this setup process.

油門桿必須維持於主旋翼角度90度的位置，不可再移動。

3. E.REV elevator reverse setup mode:

E.REV升降舵舵機反向設定模式：

Press the SET button to enter E.REV setup mode. The E.REV LED will light up after E.LIM turns off. This setup mode sets the elevator gyro direction.

1. Tilt the helicopter forward as shown in diagram, and check if swashplate is tilting correctly toward the back.

2. If the swashplate is tilting at the wrong direction, move the transmitter elevator stick until STATUS LED changes color, and re-check the swashplate tilting direction.

接著按下SET鍵，進入E.REV設定模式，此時E.LIM熄滅，E.REV燈亮起，此模式設定升降舵舵機修正方向

若圖示所示，將機身向前傾，確認十字盤的修正方向是否正確。

如果十字盤方向修正錯誤，請撥動升降舵桿改變STATUS燈顏色後，再次確認十字盤修正方向是否正確。

4. A.LIM aileron endpoints setup:

A.LIM副翼行程量設定模式：

Press the SET button to enter A.LIM setup mode. The A.LIM LED will light up after E.REV turns off. With all channels stationary, move the transmitter aileron stick to the right, and then back to center position. This completes the aileron endpoint setup process. The control unit will determine the maximum aileron endpoints.

接著按下SET鍵，進入A.LIM設定模式，此時E.REV熄滅，A.LIM燈亮起，將副翼桿向右推到底。完成後將桿桿復位，完成此模式設定，讓3G-X Flybarless解算副翼可使用行程。

**CAUTION 注意**

The throttle stick position where main pitch is 0 degree must be maintained through this setup process.

油門桿必須維持於主旋翼角度90度的位置，不可再移動。
5. A.REV aileron reverse setup mode:
A.REV 副翼舵机正反之设定模式:

Press the SET button to enter a A.REV setup mode. The A.REV LED will light up after A.UIM turns off. Tilt the helicopter right as shown in the diagram, and check if swashplate is tilting correctly toward the left. If the swashplate is tilting at the wrong direction, move the transmitter aileron stick until STATUS LED changes color, and re-check the swashplate tilting direction. Press the SET button again, and the control unit will restart with all LED's flashing.

This completes the flybywires portion of the setup process.

Next, press the SET button to select the setting mode A.REV 副翼舵机正反之设定模式. Tilt the helicopter right as shown in the diagram, and check if swashplate is tilting correctly toward the left. If the swashplate is tilting at the wrong direction, move the transmitter aileron stick until STATUS LED changes color, and re-check the swashplate tilting direction. Press the SET button again, and the control unit will restart with all LED's flashing.

This completes the flybywires portion of the setup process.

3G Flybywires system must remain stationary during startup. Do not move the helicopter until the swashplate jumps up and down slightly 3 times, indicating the completion of initialization. (Please refer to page 22 step 3)

3G Flybywires is a high-performance system, so please be careful when handling the control sticks. Do not apply too much force when operating.

1.520 μs (standard) or 760 μs (narrow band) servo frame rate setup.
1520 μs (標準) or 760 μs (窄頻) 伺服器設定

3G Flybywires system is compatible with both 760 μs narrow frame rate servos (such as Futaba S9256, S9251, BLS251), as well as the standard 1520 μs frame rate servos (most others). Proper frame rate must be selected based on your servo specifications.

To enter the setup mode: Press and hold the SET button for 2 seconds until STATUS LED flashes. The 1520/760 LED will light up indicating servo frame rate setup mode. Push the transmitter rudder stick left or right to select the frame rate. For example, if rudder is pushed to the left (or right) and STATUS LED turns green, the frame rate is set to 1520 μs. To set it to 760 μs, the rudder stick need to be pushed from the center to the opposite end and hold it for a few seconds until the STATUS LED turns red, indicating frame rate set to 760 μs.

3G Flybywires panel: Each setting value is labeled on the 3G Flybywires control unit with either green or red lettering, which corresponds to the STATUS LED color. Subsequent setup mode is entered by a single press of the SET button. Setup mode will exit if no activity is detected in 10 seconds.

3G Flybywires configuration consists of two modes: 760 μs system (e.g., Futaba S9256, S9251, BLS251), and 1520 μs system. These are the two modes, and the 760 μs system is selected by default.

For pitch servo configuration, the following settings are recommended:

- Standard: 1520 μs standard band
- Narrow band: 760 μs narrow band

Selecting the 760 μs narrow band mode will increase the response time of the servos, providing a more precise control.

Green LED: 1520 μs standard band
Red LED: 760 μs narrow band

Select by moving the rudder stick left and right.

Mode 1
- 1520 μs standard band
- 760 μs narrow band

Mode 2
- 1520 μs standard band
- 760 μs narrow band
2. DS (digital) / AS (analog) servo selection

DS數位/AS類比伺服器選擇

There is a direct correlation between servos' speed to gyro's performance. Faster servos are able to execute commands from the gyro at faster and higher precision. Due to the high performance gyro sensors used in the 3GX flybarless system, premium high speed digital rudder servos are mandatory for optimal tail performance. Some of the recommended rudder servos include Align DS650, DS620, DS520, DS420, Futaba S9257, S9256, S9254, S9253, or other servos with similar specifications.

Setup method: Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button to select DS/AS setup mode, as indicated by the lighting of DS/AS LED. Using the transmitter's rudder stick, select either digital servo DS mode (STATUS LED is green) or analog servo AS mode (STATUS LED is red).

設定方式：按住“SET”鍵2秒後進入設定模式，再按“SET”鍵選擇DS／AS選項，（DS／AS指示燈亮起），利用方向舵搖桿選擇數位DS（STATUS為綠燈）或類比AS（STATUS為紅燈）伺服器。

3. Rudder servo direction check and link adjustment

檢查尾舵伺服器正逆旋轉方向與調整連桿

Move the transmitter rudder stick left and right, and check for the correct direction of the rudder servo. If needed, servo reverse is done from the transmitter's REV (reverse) function.

For tail pitch adjustment, center the rudder servo by either setting the 3GX flybarless to normal rate mode (non-heading lock), or press and hold the SET button for 2 seconds. With the rudder servo centered and servo horn at 90 degrees, adjust the linkage length until tail pitch slider is centered on the tail output shaft as shown in diagram.

尾部擺動連桿，確認尾舵伺服器正逆轉方向是否正確，若不正確請更改調節桿上的尾舵回路連桿正逆旋轉方向。

將3GX Flybarless功能設定為非鎖定模式或按“SET”鍵2秒，使尾舵伺服器保持在中立點的位置上，調整伺服器片，盡可能使尾部連桿與伺服器保持90度，接著調整連桿長度使尾部pitch控制在適當。

4. Gyro NOR/REV setting

NOR／REV陀螺儀正反向開關設定

Lift up the helicopter by hand, and turn it to the left (yaw). Check if the rudder servo is applying correct compensation to the right. If reversed, set the NOR/REV setting as following.

Setup method: Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button to select NOR/REV setup mode, as indicated by the lighting of NOR/REV LED. Using the transmitter's rudder stick, select either NOR (STATUS LED is green) or REV (STATUS LED is red).

抬起遙控機，將機頭往左側動，若尾舵伺服器的擺動方向與遙控器的舵搖桿打右舵時相反，表示陀螺儀的動作方向設定正確，若不正確請按正反向設定。

設定方式：按住“SET”鍵後進入設定模式，選擇NOR／REV選項，以方向舵選擇NOR（STATUS為綠燈）或REV（STATUS為紅燈）。

Select by moving the rudder stick left and right

左右操縱方向舵搖桿
5. LIMIT rudder servo endpoint setting

Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button repeatedly to select LIMIT setup mode, as indicated by the lighting of LIMIT LED. Push the transmitter rudder stick left until tall pitch slider reaches the end, then center the rudder stick and wait 2 seconds for the STATUS LED to flash red. Then push the rudder stick right until tall pitch slider reaches the end, then center the rudder stick and wait 2 seconds for the STATUS LED to flash red. This completes the left and right endpoint limit adjustment of servo travel. Insufficient servo travel will degrade helicopter performance, while excessive travel will cause binding and damage rudder servo.

6. Helicopter size and DELAY settings

Green LED: suitable for larger helicopters such as T-REX 500/550/600/700
Red LED: suitable for smaller helicopter such as T-REX 250/450

For small helicopters such as T-REX 250/450, set this setting to small helicopter (STATUS LED red). For larger helicopters such as T-REX 500/550/600/700, set this setting to large helicopter (STATUS LED green).

This setting includes two functions:

1. 3G X Flybarless 支持小 / 中型遥控直升机，让您直接选择适合您的模式，例如 T-REX 250/450 调整为小模式 / 中型模式，设定值 “STATUS”指示灯显示红色；T-REX 500/550/600/700 调整为大型直升机模式，设定值“STATUS”指示灯显示绿色。

2. The DELAY function is utilized when slower rudder servo causes tail hunting (wagging). This can be observed after a hovering pirouette comes to a stop. Tail hunting occurs, gradually increase DELAY value to eliminate it. For best performance, DELAY value should be kept as low as possible without tail hunting.

Setup method: Press and hold the SET button for 2 seconds to enter the setup mode, then press the SET button to select DELAY setup mode, as indicated by the lighting of DELAY LED. The choice of small or large helicopter is done by moving the transmitter rudder stick left or right while observing the color of the STATUS LED. For small helicopters STATUS LED will be red, and large helicopter will be green.

The amount of servo delay is set by how far you push the rudder stick, followed by pushing the SET button.

(2) 使用遥控器上的按钮，在不同模式下调整直升机的响应速度和飞行稳定性。通常在不同的提案和设置下，直升机的响应速度和飞行稳定性会有所不同。设置方法：将设置为“3G”并保持在功能设置模式下，调节“DELAY”参数，以调整接收机航向控制器的延迟。设置为“Mode 1”时，建议选择“小模式”；设置为“Mode 2”时，建议选择“中型模式”。
7. Sensitivity Adjustment

For radio with built-in gyro gain settings, gain can be adjusted directly. For example, 50%–100% setting on the radio translates to 0%–100% gain in the heading lock mode. 50%–0% setting on the radio translates to 0%–100% gain in the normal (non-heading) lock mode.

Actual gain value differs amongst servos and helicopters. The goal is to find the maximum gain without tail hunting. This can only be done through actual flight tests.

The recommended starting point for the gyro gain setting should be 70–80% for hovering, 60–70% for idle-up, value should be tuned under actual flight conditions by increasing to the maximum gain without tail hunting.

Specifications

- Operating voltage range: DC 3.5V ~ 8.4V
- Operating current consumption: <30mA @ 4.8V
- Rotational detection rate: ±300°/sec
- Rudder detection rate: ±600°/sec
- Sensor resolution: 12bit
- Operating temperature: -20°C ~ 65°C

15. RCM-BL450MX 3400KV POWER COLLOCATION REFERENCE

Note: 1. Please use a pitch gauge to adjust the pitch value. Incorrect excess pitch setting will result poor helicopter performance and reduce ESC's life and battery's life.

1. 請務必使用螺旋槳規範來調整螺旋槳，不正確的螺旋槳設定不但無法發揮裝置的特性，還會影響到飛控的調達器與電池的壽命。
### RCM-BL 450MX MOTOR 無刷馬達

<table>
<thead>
<tr>
<th>Specification</th>
<th>尺寸規格</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KV</strong></td>
<td>3400KV(RPM/V)</td>
</tr>
<tr>
<td><strong>Kv值</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>Magnet Poles</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Max continuous current</strong></td>
<td>46A</td>
</tr>
<tr>
<td><strong>Max instantaneous current</strong></td>
<td>68A(5sec)</td>
</tr>
<tr>
<td><strong>Max continuous power</strong></td>
<td>500W</td>
</tr>
<tr>
<td><strong>Max instantaneous power</strong></td>
<td>730W(5sec)</td>
</tr>
<tr>
<td><strong>Dimension</strong></td>
<td>Shaft 3.5x29.2x38mm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Approx. 83g</td>
</tr>
</tbody>
</table>

### 16.RCE-BL35X BRUSHLESS SPEED CONTROLLER INSTRUCTION MANUAL 無刷調速器使用說明

#### PRODUCT FEATURES 產品特色
1. BEC output voltage (6V) shows great performance on the torque and speed of servos.
2. Three programmable throttle speed settings to support quick throttle response.
3. Include soft start and governor mode.
4. Small and compact PCB design for lightweight and simple installation.
5. Large heat sink for optimum thermal performance.
6. High compatibility with 98% of all brushless motors currently on the market.
7. Ultra-smooth motor start designed to run with all kinds of brushless motors.
8. The power inlet utilizes a Japanese made "Low ESR" capacitor in order to provide stable power source.
9. The BEC power outlet utilizes a Japanese made special polymer aluminum electrolytic capacitor, it provides better noise filtering capability than other brushless ESC on the market, delivering stable performance of R/C receiver and BEC.
10. The BEC features dual TO-252 package regulators. They provide superior thermal performance with 2A peak current.
11. The throttle has more than 200 step resolution that provides great throttle response and control.

#### WIRING ILLUSTRATION 接線示意圖

- Red
- Blue
- Black

#### SPECIFICATION 尺寸規格

<table>
<thead>
<tr>
<th>Model</th>
<th>Continuous Current</th>
<th>Peak Current</th>
<th>BEC Output</th>
<th>Dimension</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCE-BL35X</td>
<td>35A</td>
<td>50A</td>
<td>2A: 2cells LithiumIon / 6-7cells Ni-Mh / 4-5 servos</td>
<td>45x22x12mm</td>
<td>25g</td>
</tr>
</tbody>
</table>

1. Good temperature situation for working at the maximum current
2. Supporting motor types: 2 ~ 10 pole in/outrunner brushless motors.
3. Supporting maximum RPM: 2 pole 190,000 rpm; 6 pole 63,000 rpm.
4. Input voltage: 5.5V ~ 16.8V(Lithium 2 ~ 4cells/ Ni-Mh 6 ~ 12cells)

**NOTE:** When setting to the quick throttle response speed, the accelerate peak current will increase.

### FUNCTIONS 產品功能
1. Brake Option - 3 settings that include Brake disabled/Soft brake/Hard brake.
2. Electronic Timing Option - 3 settings that include Low timing/Mid timing/High timing. Generally, 2 pole motors are recommended to use low timing, while 6 or more poles should use Mid timing. High timing gives more power at the expense of efficiency. Always check the current draw after changing the timing in order to prevent overloading of battery.
3. Battery Protection Option: 2 settings that include Li-ion, Li-poly High/Middle cutoff voltage protection.
   The default setting is high cutoff voltage protection. CPU will automatically determine cell number of input Lithium battery (2S-6S). This option will prevent over-discharge of the battery. The following reference is the guideline for setting the Battery Protection option.

   3-1 Li-ion/Li-poly High cutoff voltage protection: When the voltage of single cell drops to 3.2V, the first step of battery protection mode will be engaged by the ESC resulting an reduced power. The pilot should reduce the throttle and prepare landing. If the voltage of single cell drops to 3.0V, the second step of battery protection mode will be engaged resulting in power cutoff. *(Note 1) For 11.1V/3S cells Lithium battery, the full charged voltage will be approximately 12.6V.
   According to this input voltage, CPU will determine that this is a 3S cell battery.
   First step protection: 3.2V x 3s=9.6V
   Second step protection: 3.0V x 3s=9.0V.
   When the voltage drops to 9.0V, the power will be reduced. When the voltage drops to 9.0V, the power will be cut off.

3-2 Li-ion/Li-poly Middle cutoff voltage protection: This option is same as instruction 3-1, but when the voltage of single cell drops to 3.0V, the first step of battery protection will be engaged. When the voltage of single cell drops to 2.8V, the second step of battery protection will be engaged. *(Note 1)

   Note 1: Second step of battery protection only works when Aircraft mode is setting to the option +4-1.

   Note: THIS OPTION IS ONLY SUITABLE FOR FULLY CHARGED BATTERY PACK IN GOOD WORKING CONDITION.

4. Aircraft Option: 3 settings that include Normal Airplane/Helicopter 1/Helicopter 2.
   Normal Airplane Mode is used for general airplanes and gliders. When flying Helicopters, you can choose Helicopter 1 Mode, or Helicopter 2 Mode. Helicopter 1 Mode provides Soft Start feature. Helicopter 2 Mode provides Soft Start and Governor Mode.

5. Throttle response speed: 3 settings that include standard/Quick/throttle response speed.
   The default setting is "Quick speed." Use this option to adjust the setting according to flight character. For example, setting at Medium or Quick speed for 3D and powerful flight to make the power response more quickly, but note the accelerating peak current and power expense will increase.

6. Thermal Protection: When the ESC temperature reaches 80°C for any reason, it will engage the battery protection circuit, reducing power to the ESC. We recommend mounting the ESC in a location with adequate airflow and ventilation.

7. Safe Power On Alarm: When the operator turns on the ESC, it will automatically detect the transmitter signal. The ESC will emit a confirmation tone and enter normal operation mode if the throttle is set to the lowest position. If the throttle position is at full throttle, it will begin to enter Setup Mode. If the throttle is in any other position, the ESC will emit an alarm and not enter into user mode for safety precautions.

8. Aircraft Locator: If the aircraft should land or crash in an unexpected location and become lost, the pilot can enable the Aircraft Locator Option. The Aircraft Locator Option is engaged by turning off the transmitter. When the ESC does not receive a signal from the transmitter for 30 seconds, it will start to send an alarm to the motor. The sound of the alarm will aid the pilot to locate the aircraft. This option will not work with a PCM receiver that has SAVE function enabled, or with low noise resistant RFR receivers.

9. Two-way communicator: Two-way communicator can exchange data between the ESC and transmitter. It has the function of setting the ESC parameters. The ESC can also act as a slave to receive commands from the transmitter.

10. ESC temperature sensor: ESC temperature sensor can monitor the temperature of the ESC to ensure it operates within the safe temperature range. If the temperature exceeds the safe range, the ESC will enter the protection mode to prevent damage.

11. High/Low voltage protection: ESC will enter the protection mode if the voltage exceeds the high or low voltage range. The ESC will enter the protection mode to prevent damage.

12. Over/under voltage protection: ESC will enter the protection mode if the voltage exceeds the over or under voltage range. The ESC will enter the protection mode to prevent damage.

13. Short circuit protection: ESC will enter the protection mode if the ESC detects a short circuit. The ESC will enter the protection mode to prevent damage.

14. Overcurrent protection: ESC will enter the protection mode if the current exceeds the safe range. The ESC will enter the protection mode to prevent damage.

15. Overload protection: ESC will enter the protection mode if the ESC detects an overload condition. The ESC will enter the protection mode to prevent damage.

16. Overheat protection: ESC will enter the protection mode if the ESC detects an overheating condition. The ESC will enter the protection mode to prevent damage.

17. ESC restart function: ESC will automatically restart after a protection mode is entered. The ESC will automatically restart after a protection mode is entered.

18. System control: ESC can be used to control the system, such as setting the ESC parameters and entering the protection mode.

SETUP MODE 設定模式

1. Setup mode: Make sure to connect the ESC to the throttle channel of the receiver. Please refer to the user manual of your radio system.
   The second step is to connect the 3 power-out signal pins to the brushless motor.

2. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

3. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

4. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

5. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

6. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

7. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

8. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

9. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

10. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

11. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.

12. Throttle stick positions in Setup Mode: Setup Mode includes six settings: Brake, Electronic Timing, Battery Protection, Aircraft, Throttle Speed and BEC output voltage. Every setting has three options. Simply place the throttle stick in the highest, middle, and lowest positions for each setting. For example, first brake setting (Hard): move the stick to the highest position. Then timing setting (Medium): move the throttle stick in the middle position.
ESC START-UP INSTRUCTION

Connect battery power to ESC

Current Settings Indicator Beeps

INSTRUCTIONS ON AIRCRAFT MODE SETTINGS

Normal Airplane/Glider Mode (Option 4-1):
This option is applied to general airplanes and gliders.

Helicopter 1 Mode (Option 4-2):
This option provides a soft start feature and is applied to helicopters for Normal, Idle Up 1, or Idle Up 2 modes.

Please note that the sensitivity of the gyro should be set lower when flying in Idle Up 1 or Idle Up 2 modes if tail hunting (wag) occurs due to higher rotor speed.

Helicopter 2 Mode (Option 4-3):
This option supports soft start as well as Governor Mode features and is applied to helicopters for Idle Up 1 and Idle Up 2 modes (not suitable for Normal Flight Mode). When Governor Mode is in use, the throttle should be set between 75% and 85%. Again if tail wag occurs, lower the sensitivity of the gyro to eliminate the hunting effect. The Governor Mode may not work properly in cases of insufficient rotor speed (due to improper ear ratio), poor battery discharge capability, and improper setting of gyro sensitivity and the blade pitch, etc. Please make sure all the proper adjustments have been done when using Governor Mode.

Setup Mode

Minimum 4 channel radio is required
17、3GX FLYBARLESS PREFLIGHT CHECK

Step 1 步骤1

Turn on Transmitter and then receiver power.
先開啓遙控器電源，再開啓接收器電源。

Step 2 步骤2

3GX Flybarless system will go through initialization process, as indicated by flashing of all LED’s. Do not move the helicopter or transmitter sticks until initialization process completes.
此為3GX Flybarless控制器指示燈STATUS及ERACS REV會閃動，請勿移動直升機與變動桿位，以利陀螺儀感應器進入初始化程序。

Step 3 步骤3

The completion of initialization process is indicated by the rapid up and down motion of swashplate 3 times while remaining level. Should the swashplate jumps up and down at a tilted position, the flybarless system initial setup need to be performed again.
[Refer to page 23: Flybarless system initial setup]

The pitch of helicopter will remain locked until successful initialization. If the initialization process is unable to complete, with STATUS LED blinking red. Re-check all connections, and perform another reboot with helicopter remain stationary.

Following successful initialization process, green STATUS LED indicates rudder is in heading lock mode, while red LED indicates normal non-heading mode. [Refer to P. 29 Gain Adjustment]

如圖所示，初始化完成後，十字盤會保持水平上下小幅度起動三次，表示完成開機程序。如十字盤為額外起動三次，則表示設定錯誤，請進入平行儀系統重新設定。（參見P. 23 平衡儀系統設定）

完成開機後自動儀器將被固定無法動作。如果一直無法完成開機程序STATUS 紅色閃動。請檢查觀測器及電子儀是否正常或線纜未接妥，確認後重新開機。

開機後，STATUS指示燈表示電子儀鎖定模式，亮紅燈為非鎖定模式。

Step 4 步骤4

Tilt the helicopter forward and swashplate should tilt back to compensate. If reversed, perform the flybarless initial setup again and adjust the elevator reverse setting. [Refer to P. 25: E-REV setup]

將觀測儀往前方，陀螺儀應將十字盤向後修正。如果反向，重新進入Flybarless設定模式設定升降陀螺儀修正方向。（請參考P. 25 E-REV升降陀螺儀修正反向設定模式）
Step 5
Tilt the helicopter to the right and swashplate should tilt left to compensate. If reversed, perform the flybarless initial setup again and adjust the aileron reverse setting (Refer to P.26 A:REV setup).

Step 6
With throttle stick all the way up (and down), and cyclic stick all the way left/right and up/down, check for any binding on the swashplate. If binding occurs, perform the flybarless initial setup again and adjust the endpoint limits.

Step 7
Check the center of gravity (CG) and adjust component placement until CG point is right on the main shaft of the helicopter. 設定重心位置是否適當，調整動力片位置至主軸中心線下方位置。

Step 8
With all above steps checked, restart the system and begin flight test. 確定所有動作正常後，重新開機，完成開機程序後進行飛行測試。

HELICOPTER CG CHECK PROCEDURE 直昇機機體重心檢視方式

After the battery is assembled, hold the helicopter as shown.
Once the helicopter stops rotating, the helicopter’s CG can be seen at where the head is pointing relative to the main shaft.

Adjust the frame’s CG within +/- 60 degrees from level.

18. FLIGHT ADJUSTMENT AND SETTING 飛行動作調整與設定

Please practice simulation flight before real flying 飛行前請事先熟練電腦模擬飛行

A safe and effective practice method is to use the transmitter flying on the computer through simulator software sold on the market. Do a simulation flight until you familiarize your fingers with the movements of the rudders, and keep practicing until the fingers move naturally.

1. Place the helicopter in a clear open field and the tail of helicopter point to yourself.
2. Practice to operate the throttle stick (as below illustration) and repeat practicing “Throttle high/bottom”, “Aileron left/right”, “Rudder left/right”, and “Elevator up/down”. 設定重心位置是否適當，調整動力片位置至主軸中心線下方位置。
3. The simulation flight practice is very important, please keep practicing until the fingers move naturally when you hear operation orders being called out.

In order to understand the actions and control methods of a helicopter, it is recommended to conduct a thorough simulation flight prior to real flying. This ensures that the pilot is familiar with the movements of the rudders and can perform the actions naturally.

1. Place the helicopter in an open area and face the tail of the helicopter towards yourself.
2. Practice operating the throttle stick (as shown in the illustration) and repeat practicing “Throttle high/bottom”, “Aileron left/right”, “Rudder left/right”, and “Elevator up/down”.
3. The simulation flight practice is very important. Please keep practicing until the fingers move naturally when you hear operation orders being called out.

Please practice simulation flight before real flying 飛行前請事先熟練電腦模擬飛行

A safe and effective practice method is to use the transmitter flying on the computer through simulator software sold on the market. Do a simulation flight until you familiarize your fingers with the movements of the rudders, and keep practicing until the fingers move naturally.

1. Place the helicopter in a clear open field and the tail of helicopter point to yourself.
2. Practice to operate the throttle stick (as below illustration) and repeat practicing “Throttle high/bottom”, “Aileron left/right”, “Rudder left/right”, and “Elevator up/down”.
3. The simulation flight practice is very important, please keep practicing until the fingers move naturally when you hear operation orders being called out.

In order to understand the actions and control methods of a helicopter, it is recommended to conduct a thorough simulation flight prior to real flying. This ensures that the pilot is familiar with the movements of the rudders and can perform the actions naturally.

1. Place the helicopter in an open area and face the tail of the helicopter towards yourself.
2. Practice operating the throttle stick (as shown in the illustration) and repeat practicing “Throttle high/bottom”, “Aileron left/right”, “Rudder left/right”, and “Elevator up/down”.
3. The simulation flight practice is very important. Please keep practicing until the fingers move naturally when you hear operation orders being called out.
## Flight adjustment and notice

**Flight Tips**

1. Check if the screws are firmly tightened.
2. Check if the transmitter and receivers are fully charged.

**CAUTION**

- If there are other radio control aircraft at the field, make sure to check their frequencies and tell them what frequency you are using.
- Frequency interference can cause your model, or other models to crash and increase the risk of danger.

## STARTING AND STOPPING THE MOTOR

**Starting**

First check to make sure no one else is operating on the same frequency. Then place the throttle stick at the lowest position and turn on the transmitter.

**Check the movement.**

- Are the rudders moving according to the controls?
- Follow the transmitter’s instruction manual to do a range test.
- Are the controls in the correct position?
- Follow the transmitter’s instruction manual to do a range test.

**Turning on**

ON! Step 1: First turn on the transmitter.

ON! Step 2: Connect to the helicopter power.

OFF! Step 3: Reverse the above orders to turn off.
This procedure is best performed on soft surfaces such as grass. The use of rubber skid stopper is recommended on hard surface to prevent vibration feedback from the ground to 3GX, resulting in over-corrections.

If swashplate should tilt prior to lift off, do not try to manually trim the swashplate level. This is due to vibration feedback to the 3GX, and will disappear once helicopter lifts off the ground. If manual trim is applied, helicopter will tilt immediately after liftoff.

Main rotor adjustments

1. Before adjusting, apply a red piece of tape on one blade, or paint a red stripe with a marker or paint to identify on blade.
2. Raise the throttle stick slowly and stop just before the helicopter lifts-off ground. Look at the spinning blades from the side of the helicopter.
3. Look at the path of the rotor carefully. If the two blades rotate in the same path, it does not need to adjustment. If one blade is higher or lower than the other blade, adjust the tracking immediately.

A. When rotating, the blade with higher path means the pitch too big. Please shorten pitch linkage rod (A) for regular trim.
B. When rotating, the blade with lower path means the pitch too small. Please lengthen pitch linkage rod (A) for regular trim.

Tracking adjustment is very dangerous, so please keep away from the helicopter at a distance of at least 5m.

Incorrect tracking may cause vibrations. Please repeat adjusting the tracking to make sure the rotor is correctly aligned. After tracking adjustment, please check the pitch angle is approx. +5° when hovering.

FLIGHT ADJUSTMENT AND NOTICE

During the operation of the helicopter, please stand approximately 5m diagonally behind the helicopter.

Make sure that no one or obstructions in the vicinity.

For flying safety, please carefully check if every movement and directions are correct when hovering.

Do not attempt until you have some experiences with the operation of helicopter.
STEP 1 THROTTLE CONTROL PRACTICE

When the helicopter begins to lift-off the ground, slowly reduce the throttle to bring the helicopter back down. Keep practicing this action until you control the throttle smoothly.

STEP 2 AILERON AND ELEVATOR CONTROL PRACTICE

1. Raise the throttle stick slowly.
2. Move the helicopter in any direction back, forward, left and right, slowly move the aileron and elevator sticks in the opposite direction to fly back to its original position.

STEP 3 RUDDER CONTROL PRACTICING

1. Slowly raise the throttle stick.
2. Move the nose of the helicopter to right or left, and then slowly move the rudder stick in the opposite direction to fly back to its original position.

STEP 4

After you are familiar with all actions from Step 1 to 3, draw a circle on the ground and practice within the circle to increase your accuracy.

STEP 5 DIRECTION CHANGE AND HoverING PRACTICE

After you are familiar with Step 1 to 4, stand at side of the helicopter and continue practicing Step 1 to 4. Then repeat the Step 1 to 4 by standing in front of the helicopter.
With the helicopter hovering, observe for any rapid left/right or forward/aft oscillations. If forward/aft oscillation is observed, land the helicopter, turn the ELE gain dial counterclockwise gradually, and test again. Do this until oscillation disappears.

Set the dial to 12 o'clock position as starting point.

If left/right oscillation is observed, land the helicopter, turn the AIL gain dial counterclockwise gradually, and test again. Do this until oscillation disappears.

Set the dial to 12 o'clock position as starting point.

**Elevator gain adjustment dial**

**AILeron gain adjustment dial**

**Forward/back oscillation**

**Left/right oscillation**

**FORWARD STRAIGHT LINE FLIGHT**

Put the helicopter into fast forward flight from hovering. If similar oscillation is observed, reduce the elevator gyro gain. If the helicopter pitches up, or responds slowly, increase the elevator gyro gain. Repeat test until the oscillation is eliminated. Similar method is used for aileron gyro gain. After gyro gain adjustments are completed, the helicopter cyclic rate can be tuned using transmitter’s swash AIL and ELE mixing ratio. Higher the percentage, faster the roll/flip rate. Exponential can also be added on the transmitter to soften the sensitivity for stable hover.

**Using Futaba 12ZH transmitter as an example**

<table>
<thead>
<tr>
<th>Main blade pitch settings (Collective Pitch Settings)</th>
<th>With emphasis on stability</th>
<th>With emphasis on agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main blade pitch: 9° ~ 11°</td>
<td>Main blade pitch: 11° ~ 12°</td>
<td>Main blade pitch: 11° ~ 12°</td>
</tr>
<tr>
<td>Swash pitch: 31% ~ 37%</td>
<td>Swash pitch: 37% ~ 40%</td>
<td>Swash pitch: 37% ~ 40%</td>
</tr>
<tr>
<td>Cyclic pitch settings (Adjust while in DIR mode using AIL/ELE swash AFR)</td>
<td>Cyclic Pitch +10°</td>
<td>Cyclic Pitch +12°</td>
</tr>
<tr>
<td>Swash Aileron: 50%</td>
<td>Swash Aileron: 60%</td>
<td></td>
</tr>
<tr>
<td>Elevator: 50%</td>
<td>Elevator: 60%</td>
<td></td>
</tr>
<tr>
<td>Aileron and Elevator swashplate mixing ratio settings</td>
<td>Swash Aileron: ≤ 60%</td>
<td>Swash Aileron: ≤ 60%</td>
</tr>
<tr>
<td>Elevator: ≤ 60%</td>
<td>Elevator: ≤ 60%</td>
<td></td>
</tr>
<tr>
<td>Aileron and Elevator gyro gain settings</td>
<td>12 o'clock direction (50%)</td>
<td>11 o'clock direction (40%)</td>
</tr>
<tr>
<td>12 o'clock (50%)</td>
<td>11 o'clock direction (40%)</td>
<td></td>
</tr>
</tbody>
</table>

**CAUTION**

While in DIR setup mode, the transmitter’s CCPM swash mixing values for aileron and elevator represent CYCLIC pitch values. These values affect the cyclic roll rates on the aileron and elevator in flying condition. Higher values translate to faster cyclic roll rates. If cyclic roll rate is not improved with increased swash mixing values, this is due to insufficient cyclic pitch. When this happens, cyclic pitch can be increased through the flybarless setup procedure.

Maximum cyclic pitch should be limited at 14 degrees.

For the CCPM swash mixing values, please refer to the transmitter’s manual for the recommended settings. Aileron and Elevator values are typically set using a function of the transmitter’s settings.
<table>
<thead>
<tr>
<th>Blade Tracking 雙葉平衡</th>
<th>Problem 狀況</th>
<th>Cause 原因</th>
<th>Solution 對策</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking is off 雙葉不平衡</td>
<td>Pitch linkage rods are not even length PITCH連結桿長度調整不平均</td>
<td>Adjust length of pitch linkage rods (A) 調整連結桿(A)長度</td>
<td></td>
</tr>
<tr>
<td>Headspeed too low 率速過低</td>
<td>Excessive pitch 主旋翼的pitch過高</td>
<td>Adjust pitch linkage rods (A) to reduce pitch by 4 to 5 degrees. Hovering headspeed should be around 1900RPM. 調整連結桿(A)調節pitch減少4到5度。懸停率速應為約1900RPM</td>
<td></td>
</tr>
<tr>
<td>Hovering throttle curve is too low 停止時油門曲線過低</td>
<td>Increase throttle curve at hovering point on transmitter (around 65%) 增加懸停點油門曲線(約65%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headspeed too high 率速過高</td>
<td>Not enough pitch 主旋翼的pitch過低</td>
<td>Adjust pitch linkage rods (A) to increase pitch by 4 to 5 degrees. Hovering headspeed should be around 1900RPM. 調整連結桿(A)提高pitch增加4到5度。懸停率速應為約1900RPM</td>
<td></td>
</tr>
<tr>
<td>Hovering throttle curve is too high 停止時油門曲線過高</td>
<td>Decrease throttle curve at hovering point on transmitter (around 65%) 減少懸停點油門曲線(約65%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rudder Response 尾舵反應</th>
<th>Problem 狀況</th>
<th>Cause 原因</th>
<th>Solution 對策</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drifting of tail occurs during hovering, or delay of rudder response when centering rudder stick. 尾舵在懸停時不穩定或當尾舵桿居中時尾舵反應延遲</td>
<td>Rudder neutral point improper setting 尾舵中立點設定不當</td>
<td>Reset rudder neutral point 重設中立點</td>
<td></td>
</tr>
<tr>
<td>Tail oscillates (hunting, or wags) at hover or full throttle 停止或全油門時尾舵左右晃動</td>
<td>Rudder gyro gain too low 尾舵陀螺儀感度過低</td>
<td>Increase rudder gyro gain 增加尾舵陀螺儀感度</td>
<td></td>
</tr>
<tr>
<td>Tail oscillates (hunting, or wags) at hover or full throttle 停止或全油門時尾舵左右晃動</td>
<td>Rudder gyro gain too high 尾舵陀螺儀感度過高</td>
<td>Reduce rudder gyro gain 降低尾舵陀螺儀感度</td>
<td></td>
</tr>
<tr>
<td>Forward/after oscillation when elevator is applied 升降舵動作時，機體前後晃動</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td>Turn the ELE gain dial on control box counter-clockwise, 10 degrees at a time until oscillation is eliminated. 時計順時針旋轉升降舵控制器上的升降舵陀螺儀感度旋鈕，每次旋轉約10度，直至晃動消除</td>
<td></td>
</tr>
<tr>
<td>Forward/after oscillation when elevator is applied 升降舵動作時，機體前後晃動</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td>Turn the AIL gain dial on control box counter-clockwise, 10 degrees at a time until oscillation is eliminated. 時計順時針旋轉升降舵控制器上的升降舵陀螺儀感度旋鈕，每次旋轉約10度，直至晃動消除</td>
<td></td>
</tr>
<tr>
<td>Forward/after oscillation when elevator is applied 升降舵動作時，機體前後晃動</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td>Turn the AIL gain dial on control box counter-clockwise, 10 degrees at a time until oscillation is eliminated. 時計順時針旋轉升降舵控制器上的升降舵陀螺儀感度旋鈕，每次旋轉約10度，直至晃動消除</td>
<td></td>
</tr>
<tr>
<td>Elevator input causes helicopter to drift 副翼輸入導致旋翼移動</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td></td>
</tr>
<tr>
<td>Elevator input causes helicopter to drift 副翼輸入導致旋翼移動</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td></td>
</tr>
<tr>
<td>Elevator input causes helicopter to drift 副翼輸入導致旋翼移動</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td>Elevator gyro gain too high 升降舵陀螺儀感度過高</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oscillation during flight 飛行抖動</th>
<th>Problem 狀況</th>
<th>Cause 原因</th>
<th>Solution 對策</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left/right oscillation when aileron is applied 副翼動作時，機體左右晃動</td>
<td>Aileron gyro gain too high 副翼陀螺儀感度過高</td>
<td>Turn the AIL gain dial on control box clockwise, 10 degrees at a time until drift is eliminated. 時計順時針旋轉升降舵控制器上的副翼陀螺儀感度旋鈕，每次旋轉約10度，直至晃動消除</td>
<td></td>
</tr>
<tr>
<td>Left/right oscillation when aileron is applied 副翼動作時，機體左右晃動</td>
<td>Aileron gyro gain too high 副翼陀螺儀感度過高</td>
<td>Turn the AIL gain dial on control box clockwise, 10 degrees at a time until drift is eliminated. 時計順時針旋轉升降舵控制器上的副翼陀螺儀感度旋鈕，每次旋轉約10度，直至晃動消除</td>
<td></td>
</tr>
<tr>
<td>Left/right oscillation when aileron is applied 副翼動作時，機體左右晃動</td>
<td>Aileron gyro gain too high 副翼陀螺儀感度過高</td>
<td>Turn the AIL gain dial on control box clockwise, 10 degrees at a time until drift is eliminated. 時計順時針旋轉升降舵控制器上的副翼陀螺儀感度旋鈕，每次旋轉約10度，直至晃動消除</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drifting during flight 飛行變移</th>
<th>Problem 狀況</th>
<th>Cause 原因</th>
<th>Solution 對策</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aileron input causes helicopter to drift 副翼動作導致旋翼移動</td>
<td>Aileron gyro gain too low 副翼陀螺儀感度過低</td>
<td>Elevator gyro gain too low 升降舵陀螺儀感度過低</td>
<td></td>
</tr>
<tr>
<td>Aileron input causes helicopter to drift 副翼動作導致旋翼移動</td>
<td>Aileron gyro gain too low 副翼陀螺儀感度過低</td>
<td>Elevator gyro gain too low 升降舵陀螺儀感度過低</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Response 動作反應</th>
<th>Problem 狀況</th>
<th>Cause 原因</th>
<th>Solution 對策</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow Forward/Alt/Left/Right input response 前後左右動作反應反應過慢</td>
<td>Roll rate too low 滚轉速率太低</td>
<td>Increase the swashplate AFR in transmitter 調整傳感器(ForwardSwash)感度，提高滾轉速率</td>
<td></td>
</tr>
<tr>
<td>Slow Forward/Alt/Left/Right input response 前後左右動作反應反應過慢</td>
<td>Roll rate too high 滾轉速率過高</td>
<td>Decrease the swashplate AFR in transmitter 調整傳感器(ForwardSwash)感度，降低滾轉速率</td>
<td></td>
</tr>
</tbody>
</table>
| Sensitive Forward/Alt/Left/Right input response 前後左右動作反應反應過快 | Roll rate too fast after swash AFR adjustment; cyclic pitch too high 已經調整後仍出現過快反應，副翼傾角過高 | Go back through the DIR setup procedure and decrease the cyclic pitch. 重新進入DIR模式，設定較小的副翼傾角角度。
| Sensitive Forward/Alt/Left/Right input response 前後左右動作反應反應過快 | Roll rate too fast after swash AFR adjustment; cyclic pitch too high 已經調整後仍出現過快反應，副翼傾角過高 | Go back through the DIR setup procedure and decrease the cyclic pitch. 重新進入DIR模式，設定較小的副翼傾角角度。 |

If above solution does not resolve your issues, please check with experienced pilots or contact your Align dealer.

*在做完以上調整後，仍無法改善情況時，應立即停止飛行並向有經驗的飛行員諮詢或由您的經銷商。*
Pitches up during fast forward flight.
- Elevator gain too low, increase the elevator gain by gradually turning the ELE dial clockwise.
- Elevator trim not centered. Check if helicopter is lifting backwards during hover.

Insufficient gain during flight, but increasing gain results in oscillation.
1. Check and resolve possible mechanical vibration from helicopter.
2. Use softer 3GX mounting foam, or double up the stock 3GX foam.
3. Relocate the 3GX to location less prone to vibration.

Drifting during 3D maneuvers.
1. Increase AIL and ELE gain by turning both dials clockwise.
2. Check if cyclic servos are too slow (minimum 0.1 sec / 60 degrees)
3. Spinning during 3D may be due to a structural issue.
4. Increase the helicopter's roll rate.

Unstable hover, control inputs are too sensitive.
- Decrease the aileron and elevator ATAV/AHR value on the transmitter. For CCPM machines, decrease swashplate mixing percentage on the transmitter. In addition, exponential can be added to aileron and elevator channels.

After increasing the ATAV(AHR) of aileron and elevator, 3D roll rates are still not enough.
- Go back through the DIR setup procedure and use larger cyclic pitch.

Helicopter oscillates after fast forward flight or after tumbles.
1. Gradually reduce both AIL and ELE gain by turning them counterclockwise, 10 degrees at a time.
2. Use harder head dampener.

Incorrect CCPM mixing after initial flybarless setup.
1. Trim adjustments not carried out on transmitter.
2. Any trim adjustments are done on transmitter, the initial flybarless setup procedure need to be performed again.
3. Please turn off the swashring linkagage compensation, Swash Mix, Mixing, Acceleration and other collective mixing functions in the transmitter.

3GX flybarless system unable to power up.
1. Check proper voltage source.
2. Check AILEP/MIX connections between flybarless control unit and receiver.
3. Check the power connection of 3GX and receiver.

I noticed swashplate lifts slightly at extreme pitch due to servo interactions, should I make efforts to level it out?
No. The 3GX system automatically calculates a c少吃plate mix percentage. Setting of elevator swash mix has no affect on the 3GX system. Set the cyclic pitch by the aileron swash mix & just use the same value for elevator.
Specifications & Equipment:

- Length: 635mm
- Height: 222mm
- Main Blade Length: 325mm
- Main Rotor Diameter: 710mm
- Tail Rotor Diameter: 158mm
- Motor Pinion Gear: 15T
- Main Drive Gear: 150T
- Autorotation Tail Drive Gear: 106T
- Tail Drive Gear: 25T
- Drive Gear Ratio: 1:10:4.24
- Weight (w/o main blade): 530g
- Flying Weight (w/ Full): 640g